<110> Sun, Jindong
Zobrist, Kimberly
Wu, Jingrui
Fu, Changlin
Dotson, Stanton B.
Lutfiyya, Linda L.

<120> Transgenic Plants

<130> 38-21(52743)B

<150> US 60/449,054

<151> 2003-02-22

<160> 12

<210> 1
<211> 270
<212> PRT
<213> Arabidopsis thaliana

<400> 1

Met Glu Leu Asn Arg Ser Glu Ala Asp Glu Ala Lys Ala Glu Thr Thr
1 5 10 15

Pro Thr Gly Gly Ala Thr Ser Ser Ala Thr Ala Ser Gly Ser Ser Ser
20 25 30

Gly Arg Arg Pro Arg Gly Arg Pro Ala Gly Ser Lys Asn Lys Pro Lys
35 40 45

Pro Pro Thr Ile Ile Thr Arg Asp Ser Pro Asn Val Leu Arg Ser His
50 55 60

Val Leu Glu Val Thr Ser Gly Ser Asp Ile Ser Glu Ala Val Ser Thr
65 70 75 80

Tyr Ala Thr Arg Arg Gly Cys Gly Val Cys Ile Ile Ser Gly Thr Gly
85 90 95

Ala Val Thr Asn Val Thr Ile Arg Gln Pro Ala Ala Pro Ala Gly Gly
100 105 110

Gly Val Ile Thr Leu His Gly Arg Phe Asp Ile Leu Ser Leu Thr Gly
115 120 125

Thr Ala Leu Pro Pro Pro Ala Pro Pro Gly Ala Gly Gly Leu Thr Val
130 135 140

Tyr Leu Ala Gly Gly Gln Gly Gln Val Val Gly Gly Asn Val Ala Gly
145 150 155 160

Ser Leu Ile Ala Ser Gly Pro Val Val Leu Met Ala Ala Ser Phe Ala
165 170 175

```
Asn Ala Val Tyr Asp Arg Leu Pro Ile Glu Glu Glu Glu Thr Pro Pro
            180                 185                 190

Pro Arg Thr Thr Gly Val Gln Gln Gln Pro Glu Ala Ser Gln Ser
        195                 200                 205

Ser Glu Val Thr Gly Ser Gly Ala Gln Ala Cys Glu Ser Asn Leu Gln
    210                 215                 220

Gly Gly Asn Gly Gly Gly Gly Val Ala Phe Tyr Asn Leu Gly Met Asn
225                 230                 235                 240

Met Asn Asn Phe Gln Phe Ser Gly Gly Asp Ile Tyr Gly Met Ser Gly
                245                 250                 255

Gly Ser Gly Gly Gly Gly Gly Gly Ala Thr Arg Pro Ala Phe
            260                 265                 270
```

<210> 2
<211> 295
<212> PRT
<213> Oryza sativa

<400> 2

```
Met Glu His Ser Lys Met Ser Pro Asp Lys Ser Pro Val Gly Glu Gly
1               5                   10                  15

Asp His Ala Gly Gly Ser Gly Ser Gly Gly Val Gly Gly Asp His Gln
            20                  25                  30

Pro Ser Ser Ser Ala Met Val Pro Val Glu Gly Gly Ser Gly Ser Ala
        35                  40                  45

Gly Gly Ser Gly Ser Gly Gly Pro Thr Arg Arg Pro Arg Gly Arg Pro
    50                  55                  60

Pro Gly Ser Lys Asn Lys Pro Lys Pro Pro Ile Ile Val Thr Arg Asp
65                  70                  75                  80

Ser Pro Asn Ala Leu His Ser His Val Leu Glu Val Ala Gly Gly Ala
                85                  90                  95

Asp Val Val Asp Cys Val Ala Glu Tyr Ala Arg Arg Arg Gly Arg Gly
            100                 105                 110

Val Cys Val Leu Ser Gly Gly Gly Ala Val Val Asn Val Ala Leu Arg
        115                 120                 125

Gln Pro Gly Ala Ser Pro Pro Gly Ser Met Val Ala Thr Leu Arg Gly
    130                 135                 140

Arg Phe Glu Ile Leu Ser Leu Thr Gly Thr Val Leu Pro Pro Pro Ala
145                 150                 155                 160
```

```
Pro Pro Gly Ala Ser Gly Leu Thr Val Phe Leu Ser Gly Gly Gln Gly
                165                 170                 175

Gln Val Ile Gly Gly Ser Val Val Gly Pro Leu Val Ala Ala Gly Pro
            180                 185                 190

Val Val Leu Met Ala Ala Ser Phe Ala Asn Ala Val Tyr Glu Arg Leu
        195                 200                 205

Pro Leu Glu Gly Glu Glu Glu Glu Val Ala Ala Pro Ala Ala Gly Gly
    210                 215                 220

Glu Ala Gln Asp Gln Val Ala Gln Ser Ala Gly Pro Pro Gly Gln Gln
225                 230                 235                 240

Pro Ala Ala Ser Gln Ser Ser Gly Val Thr Gly Gly Asp Gly Thr Gly
                245                 250                 255

Gly Ala Gly Gly Met Ser Leu Tyr Asn Leu Ala Gly Asn Val Gly Gly
            260                 265                 270

Tyr Gln Leu Pro Gly Asp Asn Phe Gly Gly Trp Ser Gly Ala Gly Ala
        275                 280                 285

Gly Gly Val Arg Pro Pro Phe
    290                 295
```

<210> 3
<211> 230
<212> PRT
<213> Gossypium hirsutum

<400> 3

```
Ala Phe Gly Ser His Tyr Lys Leu Trp Arg Arg Ser Thr Thr Ser Gly
1               5                   10                  15

Lys Lys Pro Arg Gly Arg Pro Ala Gly Ser Lys Asn Lys Pro Lys Ser
            20                  25                  30

Pro Ile Ile Val Ala Arg Asp Ser Pro Asn Ser Leu Arg Ser His Val
        35                  40                  45

Leu Glu Ile Ser Ser Gly Ser Asp Ile Val Asp Ser Val Trp Gly Tyr
    50                  55                  60

Ala Arg Arg Arg Gly Arg Gly Val Cys Val Leu Ser Gly Thr Gly Ala
65                  70                  75                  80

Val Thr Asn Val Thr Leu Arg Gln Pro Ala Ala Pro Pro Gly Ser Val
                85                  90                  95

Val Thr Leu His Gly Arg Phe Glu Ile Leu Ser Leu Thr Gly Thr Ser
            100                 105                 110
```

```
Leu Pro Pro Pro Ala Pro Pro Gly Ala Gly Gly Leu Thr Val Tyr Leu
        115                 120                 125

Ala Gly Val Gln Gly Gln Val Val Gly Gly Ser Val Val Gly Pro Leu
    130                 135                 140

Met Ala Ser Gly Pro Val Val Leu Met Ala Ala Ser Phe Ala Asn Ala
145                 150                 155                 160

Val Tyr Asp Arg Leu Pro Leu Glu Glu Glu Asp Pro Pro Thr Val His
                165                 170                 175

Glu Gln Gln Pro Ala Ala Ser Gln Ser Ser Gly Leu Thr Gly Ser Gly
            180                 185                 190

Gly Gly Asn Asn Asn Asn Cys Gly Thr Thr Gly Thr Gly Val Gly Gly
        195                 200                 205

Gly Gly Gly Gly Val Pro Phe Tyr Asn Leu Gly Pro Asn Met Gly Thr
    210                 215                 220

Tyr Pro Phe Pro Gly Leu
225                 230
```

<210> 4
<211> 974
<212> DNA
<213> Arabidopsis thaliana

<400> 4

```
ccccccgacc tgcctctaca gagacctgaa gattccagaa ccccacctga tcaaaaataa   60

catggaactt aacagatctg aagcagacga agcaaaggcc gagaccactc ccaccggtgg  120

agccaccagc tcagccacag cctctggctc ttcctccgga cgtcgtccac gtggtcgtcc  180

tgcaggttcc aaaaacaaac ccaaacctcc gacgattata actagagata gtcctaacgt  240

ccttagatca cacgttcttg aagtcacctc cggttcggac atatccgagg cagtctccac  300

ctacgccact cgtcgcggct gcggcgtttg cattataagc ggcacgggtg cggtcactaa  360

cgtcacgata cggcaacctg cggctccggc tggtggaggt gtgattaccc tgcatggtcg  420

gtttgacatt ttgtctttga ccggtactgc gcttccaccg cctgcaccac cgggagcagg  480

aggtttgacg gtgtatctag ccggaggtca aggacaagtt gtaggaggga atgtggctgg  540

ttcgttaatt gcttcgggac cggtagtgtt gatggctgct tcttttgcaa acgcagttta  600

tgataggtta ccgattgaag aggaagaaac cccaccgccg agaaccaccg gggtgcagca  660

gcagcagccg gaggcgtctc agtcgtcgga ggttacgggg agtggggccc aggcgtgtga  720

gtcaaacctc caaggtggaa atggtggagg aggtgttgct ttctacaatc ttggaatgaa  780
```

tatgaacaat tttcaattct ccgggggaga tatttacggt atgagcggcg gtagcggagg 840

aggtggtggc ggtgcgacta gacccgcgtt ttagagtttt agcgttttgg tgacaccttt 900

tgttgcgttt gcgtgtttga cctcaaacta ctaggctact agctatagcg gttgcgaaat 960

gcgaatatta ggtt 974

<210> 5
<211> 1071
<212> DNA
<213> Oryza sativa

<400> 5

atggccggga tggaccctgg cgggggcggc gccggcgccg gcagctcacg gtacttccac 60

catctgctcc gaccgcagca gccgtcgccg ctgtcaccgc tgtcgccgac atcccatgtc 120

aagatggagc actccaagat gtcacccgac aagagccccg tgggcgaggg agatcacgcg 180

ggagggagtg gaagcggcgg cgtcggcggt gaccaccagc cgtcgtcgtc ggccatggtg 240

cccgtcgagg gtggcagcgg cagcgccggc ggtagtggct cgggtgggcc gacgcggcgc 300

ccgcgcgggc gcccgcccgg gtccaagaac aagccgaagc cgcccatcat cgtgacgcgc 360

gacagcccga acgcgctgca ctcgcacgtg ctcgaggtcg ccggcggcgc cgacgtcgtc 420

gactgcgtgg ccgagtacgc ccgccgccga gggcgcggcg tgtgcgtgct gagcggcggc 480

ggcgccgtcg tcaacgtggc gctgcggcag ccgggcgcgt cgccgccggg cagcatggtg 540

gccacgctgc ggggccggtt cgagatccta tctctcacgg gcacggtcct gccgcctccc 600

gcgccacccg gcgcgagcgg cctcaccgtg ttcctctccg gcggccaggg ccaggtgatc 660

ggcggcagcg tggtgggccc gctggtcgcc gcggggcccg tcgtcctgat ggcggcctca 720

ttcgcgaacg ccgtgtacga gcggctgccg ctggagggcg aggaagagga ggtcgccgcg 780

cccgccgccg gaggcgaagc acaagatcaa gtggcacaat cagctggacc cccagggcag 840

caaccggcgg cgtcacagtc ctccggcgtg acaggaggcg acggcaccgg cggcgccggt 900

ggcatgtcgc tctacaacct cgccgggaat gtgggaggct atcagctccc cggagacaac 960

ttcggaggtt ggagcggcgc cggcgccggc ggagtcaggc caccgttctg acccatgtct 1020

tagcatccag ttcaaaaatt ctccaaatta agaattgcgc agtgcagaag c 1071

<210> 6
<211> 693
<212> DNA
<213> Gossypium hirsutum

<400> 6

gcgttcggca gccactacaa gctctggagg aggagtacca cgtcgggaaa aaaacctaga 60

ggacgtccag cgggatccaa gaacaagccg aaatcaccca taatcgttgc tcgcgacagt 120

ccgaactcgt tgagatccca cgtgctcgaa atctcttccg gttcagacat agttgactcg 180

gtgtggggct acgcacggcg gcgcggccgt ggcgtttgtg tactcagcgg gaccggtgcc 240

gtcacgaatg tcacgttaag gcaaccggct gctccacctg gaagtgtcgt aacactacac 300

ggtcggttcg agattttatc tttaaccggg acttctctcc caccgccagc accgcctgga 360

gctggtggat tgacggttta tctcgccggc gttcaaggtc aagtagtcgg aggaagcgtg 420

gtgggaccgt taatggcttc aggtccagtc gtattaatgg ctgcatcgtt cgccaatgca 480

gtttacgata ggttacctct cgaagaagaa gacccaccaa ccgttcacga acaacaacca 540

gcagcttcac aatcatccgg attaaccggc agtggcggcg gaaacaacaa caactgtgga 600

acaaccggaa ccggcgtagg cggcggcggc ggcggggttc ctttctataa tttgggacca 660

aacatgggaa cttatccatt tccaggatta tga 693

<210> 7
<211> 99
<212> PRT
<213> Arabidopsis thaliana

<400> 7

Ala Lys Pro Pro Ile Ile Val Thr Arg Asp Ser Pro Asn Ala Leu Arg
1 5 10 15

Ser His Val Leu Glu Val Ser Pro Gly Ala Asp Ile Val Glu Ser Val
20 25 30

Ser Thr Tyr Ala Arg Arg Arg Gly Arg Gly Val Ser Val Leu Gly Gly
35 40 45

Asn Gly Thr Val Ser Asn Val Thr Leu Arg Gln Val Val Thr Leu His
50 55 60

Gly Arg Phe Glu Ile Leu Ser Leu Thr Gly Thr Val Leu Pro Pro Pro
65 70 75 80

Ala Pro Pro Gly Ala Gly Gly Leu Ser Ile Phe Leu Ala Gly Gly Gln
85 90 95

Gly Gln Val

<210> 8
<211> 99
<212> PRT
<213> Arabidopsis thaliana

<400> 8

Pro Lys Pro Pro Thr Ile Ile Thr Arg Asp Ser Pro Asn Val Leu Arg
1 5 10 15

Ser His Val Leu Glu Val Thr Ser Gly Ser Asp Ile Ser Glu Ala Val
20 25 30

Ser Thr Tyr Ala Thr Arg Arg Gly Cys Gly Val Cys Ile Ile Ser Gly
35 40 45

Thr Gly Ala Val Thr Asn Val Thr Ile Arg Gln Val Ile Thr Leu His
50 55 60

Gly Arg Phe Asp Ile Leu Ser Leu Thr Gly Thr Ala Leu Pro Pro Pro
65 70 75 80

Ala Pro Pro Gly Ala Gly Gly Leu Thr Val Tyr Leu Ala Gly Gly Gln
85 90 95

Gly Gln Val

<210> 9
<211> 107
<212> PRT
<213> Gossypium hirsutum

<400> 9

Pro Lys Ser Pro Ile Ile Val Ala Arg Asp Ser Pro Asn Ser Leu Arg
1 5 10 15

Ser His Val Leu Glu Ile Ser Ser Gly Ser Asp Ile Val Asp Ser Val
20 25 30

Trp Gly Tyr Ala Arg Arg Arg Gly Arg Gly Val Cys Val Leu Ser Gly
35 40 45

Thr Gly Ala Val Thr Asn Val Thr Leu Arg Gln Pro Ala Ala Pro Pro
50 55 60

Gly Ser Val Val Thr Leu His Gly Arg Phe Glu Ile Leu Ser Leu Thr
65 70 75 80

Gly Thr Ser Leu Pro Pro Pro Ala Pro Pro Gly Ala Gly Gly Leu Thr
85 90 95

Val Tyr Leu Ala Gly Val Gln Gly Gln Val Val
100 105

<210> 10
<211> 109
<212> PRT
<213> Oryza sativa

<400> 10

Pro Lys Pro Pro Ile Ile Val Thr Arg Asp Ser Pro Asn Ala Leu His
1 5 10 15

Ser His Val Leu Glu Val Ala Gly Gly Ala Asp Val Val Asp Cys Val
20 25 30

Ala Glu Tyr Ala Arg Arg Arg Gly Arg Gly Val Cys Val Leu Ser Gly
35 40 45

Gly Gly Ala Val Val Asn Val Ala Leu Arg Gln Pro Gly Ala Ser Pro
50 55 60

Pro Gly Ser Met Val Ala Thr Leu Arg Gly Arg Phe Glu Ile Leu Ser
65 70 75 80

Leu Thr Gly Thr Val Leu Pro Pro Pro Ala Pro Pro Gly Ala Ser Gly
85 90 95

Leu Thr Val Phe Leu Ser Gly Gly Gln Gly Gln Val Ile
100 105

<210> 11
<211> 108
<212> PRT
<213> Artificial sequence

<220>
<223> Synthetic construct

<220>
<221> unsure
<222> (1)..(108)
<223> unsure at all Xaa locations

<220>
<221> UNSURE
<222> (3)..(3)
<223> Xaa is Proline or Serine

<220>
<221> UNSURE
<222> (1)..(1)
<223> Xaa is Alanine or Proline

<220>
<221> UNSURE
<222> (5)..(5)
<223> Xaa is Isoleucine or Threonine

<220>
<221> UNSURE
<222> (7)..(7)
<223> Xaa is Valine or Isoleucine

<220>
<221> UNSURE
<222> (8)..(8)
<223> Xaa is Threonine or Alanine

<220>
<221> UNSURE
<222> (14)..(14)
<223> Xaa is Alanine or Valine or Serine

<220>
<221> UNSURE
<222> (16)..(16)
<223> Xaa is Arginine or Histidine

<220>
<221> UNSURE
<222> (22)..(22)
<223> Xaa is Valine or Isoleucine

<220>
<221> UNSURE
<222> (23)..(23)
<223> Xaa is Serine or Threonine or Alanine

<220>
<221> UNSURE
<222> (24)..(24)
<223> Xaa is Proline or Serine or Glycine

<220>
<221> UNSURE
<222> (26)..(26)
<223> Xaa is Alanine or Serine

<220>
<221> UNSURE
<222> (28)..(28)
<223> Xaa is Isoleucine or Valine

<220>
<221> UNSURE
<222> (29)..(29)
<223> Xaa is Valine or Serine

<220>
<221> UNSURE
<222> (30)..(30)
<223> Xaa is Glutamic Acid or Aspartic Acid

<220>
<221> UNSURE
<222> (31)..(31)
<223> Xaa is Serine or Alanine or Cysteine

<220>
<221> UNSURE
<222> (33)..(33)
<223> Xaa is Serine or Tryptophan or Alanine

<220>
<221> UNSURE
<222> (34)..(34)
<223> Xaa is Threonine or Glycine or Glutamic Acid

<220>
<221> UNSURE
<222> (37)..(37)
<223> Xaa is Arginine or Threonine

<220>
<221> UNSURE
<222> (41)..(41)
<223> Xaa is Arginine or Cysteine

<220>
<221> UNSURE
<222> (44)..(44)
<223> Xaa is Serine or Cysteine

<220>
<221> UNSURE
<222> (45)..(45)
<223> Xaa is Valine or Isoleucine

<220>
<221> UNSURE
<222> (46)..(46)
<223> Xaa is Leucine or Isoleucine

<220>
<221> UNSURE
<222> (47)..(47)
<223> Xaa is Glycine or Serine

<220>
<221> UNSURE
<222> (49)..(49)
<223> Xaa is Asparagine or Threonine or Glycine

<220>
<221> UNSURE
<222> (51)..(51)
<223> Xaa is Threonine or Alanine

<220>
<221> UNSURE
<222> (53)..(53)
<223> Xaa is Serine or Threonine or Valine

<220>
<221> UNSURE
<222> (56)..(56)
<223> Xaa is Threonine or Alanine

<220>
<221> UNSURE
<222> (57)..(57)
<223> Xaa is Leucine or Isoleucine

<220>
<221> UNSURE
<222> (60)..(68)
<223> Xaa can be any naturally occurring amino acid or can be none

<220>
<221> UNSURE
<222> (70)..(70)
<223> Xaa is Valine or Isoleucine or Alanine

<220>
<221> UNSURE
<222> (73)..(73)
<223> Xaa is Histidine or Arginine

<220>
<221> UNSURE
<222> (77)..(77)
<223> Xaa is Glutamic Acid or Aspartic Acid

<220>
<221> UNSURE
<222> (85)..(85)
<223> Xaa is Valine or Alanine or Serine

<220>
<221> UNSURE
<222> (95)..(95)
<223> Xaa is Glycine or Serine

<220>
<221> UNSURE
<222> (98)..(98)
<223> Xaa is Serine or Threonine

<220>
<221> UNSURE
<222> (99)..(99)
<223> Xaa is Isoleucine or Valine

<220>
<221> UNSURE
<222> (100)..(100)
<223> Xaa is Phenylalanine or Tyrosine

<220>
<221> UNSURE
<222> (104)..(104)
<223> Xaa is Glycine or Valine

<400> 11

Xaa Lys Xaa Pro Xaa Ile Xaa Xaa Arg Asp Ser Pro Asn Xaa Leu Xaa
1 5 10 15

Ser His Val Leu Glu Xaa Xaa Xaa Gly Xaa Asp Xaa Xaa Xaa Xaa Val
20 25 30

Xaa Xaa Tyr Ala Xaa Arg Arg Gly Xaa Gly Val Xaa Xaa Xaa Xaa Gly
35 40 45

Xaa Gly Xaa Val Xaa Asn Val Xaa Xaa Arg Gln Xaa Xaa Xaa Xaa Xaa
50 55 60

Xaa Xaa Xaa Xaa Val Xaa Thr Leu Xaa Gly Arg Phe Xaa Ile Leu Ser
65 70 75 80

Leu Thr Gly Thr Xaa Leu Pro Pro Pro Ala Pro Pro Gly Ala Xaa Gly
85 90 95

Leu Xaa Xaa Xaa Leu Ala Gly Xaa Gln Gly Gln Val
100 105

<210> 12
<211> 1473
<212> DNA
<213> Arabidopsis thaliana

<400> 12

tctcaagctt ctctctcctt tttttcccat agcacatcag aatcgctaaa tacgactcct 60

atgcaaagaa gaagctactt ctttctcttg ccctaattaa tctacctaac tagggtttcc 120

tcttaccttt catgagagag atcatttaac ataagtcacc ttttttatat cttttgcttc 180

gtctttaatt tagttctgtt cttggtctgt ttctatattt tgtcggcttg cgtaaccgat 240

cacaccttaa tgctttagct attgtttcct caaaatcatg agttttgact tctcgatctg 300

agttttcttt ttctctcttt acgctcttct tcacctagct accaatatat gaacgagcag 360

gatcaagaat cgagaaattg atttgagctg gcgaataagc agtggtggga tagggaatta 420

gtagatgcgg cggcgatgga aggcggttac gagcaaggcg gtggagcttc tagatacttc 480

cataacctct ttagaccgga gattcaccac caacagcttc aaccgcaggg cgggatcaat 540

cttatcgacc agcatcatca tcagcaccag caacatcaac aacaacaaca accgtcggat 600

gattcaagag aatctgacca ttcaaacaaa gatcatcatc aacagggtcg acccgattca 660

gacccgaata catcaagctc agcaccggga aaacgtccac gtggacgtcc accaggatct 720

aagaacaaag ccaagccacc gatcatagta actcgtgata gccccaacgc gcttagatct 780

cacgttcttg aagtatctcc tggagctgac atagttgaga gtgtttccac gtacgctagg 840

aggagaggga gaggcgtctc cgttttagga ggaaacggca ccgtatctaa cgtcactctc 900

cgtcagccag tcactcctgg aaatggcggt ggtgtgtccg gaggaggagg agttgtgact 960

ttacatggaa ggtttgagat tctttcgcta acggggactg ttttgccacc tcctgcaccg 1020

cctggtgccg gtggtttgtc tatattttta gccggagggc aaggtcaggt ggtcggagga 1080

agcgttgtgg ctccccttat tgcatcagct ccggttatac taatggcggc ttcgttctca 1140

aatgcggttt tcgagagact accgattgag gaggaggaag aagaaggtgg tggtggcgga 1200

ggaggaggag gaggagggcc accgcagatg caacaagctc catcagcatc tccgccgtct 1260

ggagtgaccg gtcagggaca gttaggaggt aatgtgggtg gttatgggtt ttctggtgat 1320

cctcatttgc ttggatgggg agctggaaca ccttcaagac caccttttta attgaatttt 1380

aatgtccgga aatttatgtg tttttatcat cttgaggagt cgtctttcct ttgggatatt 1440

tggtgtttaa tgtttagttg atatgcatat ttt 1473